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"5. Proper Freedom—freedom from mechanical and other disturbances which would interfere with its supply of food, water, warmth and light, and prevent it from carrying on its natural functions."

And again, under the heading 'The Living Matter and the Actively Living Structure,' the author says:

"As Hertwig has so strongly emphasized, the living and active protoplasm is to be regarded not as a chemical compound or an association of chemical compounds, but rather as an orderly arrangement of these into a definite structure, of which water is an indispensable constituent. Some of the water contained within the cell should be considered to be as much a constructive constituent of the living protoplast as the water is of the crystal of copper sulphate. As, without a certain amount of water, one can never have crystals, no matter how much copper sulphate may be present, so also, without the necessary amount of water we can never have active protoplasm. When the water of constitution is withdrawn, all the activities of the cell cease with the demolition of its structure."

In the carrying out of the author's plan he devotes one chapter to nutrition, another to absorption and movement of water, still another to growth, one to irritability and one to reproduction. In the chapter on the absorption and movement of water the author's treatment of transpiration is interesting. Thus, on page 136, we find the following:

"From all their surfaces exposed to the air, plants give off water-vapor. This is a physical necessity, for water-vapor will be given off from any mass, lifeless or living, which contains water, whenever the surrounding air is not saturated with moisture, or when the mass has a temperature higher than that of the air, or when the mass, in relatively dry air, is not enclosed in a waterproof covering. Other things being equal, the amount of water-vapor given off will be greater the greater the exposed surface in proportion to the mass. With like conditions of humidity, temperature, surface-composition and surface-area, equal masses of different composition, will dry, *i. e.*, lose water by evaporation, at different rates, a gelatinous or slimy mass more slowly than a woody one, for example. The living plant differs from a dead one of exactly the same dimensions in being able to control four of these five factors, and to that degree it is able

to control the rate and the amount of evaporation. Because evaporation from the body of the living plant is controllable within certain limits by the plant itself, and to this extent is a physiological process, it has been given the separate name of transpiration."

After a little further discussion he says: 'Transpiration is, therefore, a physical process controlled but not carried on by the living plant. According to circumstances it may be more or less rapid than simple evaporation.' This view of the nature of transpiration is one which the present reviewer has held for many years, contrary to the views of many of the older physiologists, and it is gratifying to find that Dr. Peirce holds this physical view of the transpiration process.

In passing we notice with interest what the author has to say with reference to ecology, to which he refers very briefly on pages 252-253. Of it he says: 'Meantime it is more or less the fashion under the name of ecology to view things in the large way, and by feeling rather than by the application of exact physiological methods, to reach conclusions regarding the effects of environment and of association.' We gather from this that the author has little use for the looser ecological methods, and in this again the present reviewer must heartily agree with him.

The volume is full of original suggestions, and differs quite markedly from the old-time works devoted to plant physiology. We congratulate the author upon the success which we are sure must attend the publication of this book.

CHARLES E. BESSEY.

THE UNIVERSITY OF NEBRASKA.

Caterpillars and their Moths. By IDA MITCHELL ELIOT and CAROLINE GRAY SOULE. New York, The Century Company.

In this handsome book of more than three hundred pages we have a very valuable contribution to the literature of popular entomology. The authors have mapped out for themselves a special field and have occupied it to excellent advantage. The caterpillars chosen for treatment are those of the larger moths, especially the more common ones, no

attempt being made to discuss the vast array of species in the Micro-lepidoptera.

The book is divided into two parts, the first fifty-six pages being devoted to the six chapters of Part I. In these chapters general directions for collecting, studying and rearing caterpillars are given—directions of great value to the beginner and of decided suggestiveness to the experienced entomologist. The remaining eleven chapters are devoted to the biographies of many species of Sphingidæ, Arctiidæ, Saturniidæ, Ceratocampidæ, Limacodidæ, Notodontidæ and Noctuidæ. These life histories are written in simple, lucid English, each insect being described in its progress from the egg to the adult in a way that any one can understand. The usefulness of the book is greatly increased by the admirable illustrations from photographs of living caterpillars and spread moths by Miss Edith Eliot. These are certainly among the best photographs of living insects that have been published.

The authors and the illustrator are to be congratulated on having prepared a book which will be of use not only to entomologists, but also to great numbers of teachers and pupils interested in nature study in the schools.

CLARENCE M. WEED.

SCIENTIFIC JOURNALS AND ARTICLES.

THE June number (volume 9, number 9) of the *Bulletin of the American Mathematical Society* contains the following articles: 'Singular Points of Functions which Satisfy Partial Differential Equations of the Elliptic Type,' by M. Bôcher; 'Errata in Gauss's *Tafel der Anzahl der Classen binärer quadratischer Formen*,' by A. M. Nash (communicated by E. B. Elliott); 'The Logarithm as a Direct Function,' by E. McClintock; review of Klein-Fricke's 'Automorphic Functions,' by J. I. Hutchinson; review of Loria's 'Special Plane Curves,' by E. B. Wilson; 'Shorter Notices'; 'Notes'; 'New Publications.' The July number of the *Bulletin* contains: Reports of the April meeting and sectional meetings of the society; 'A Fundamental Theorem with Respect to Transitive Substi-

tution Groups,' by G. A. Miller; 'The Characterization of Collineations,' by E. Kasner; review of Goursat's 'Cour d'Analyse,' by W. F. Osgood; 'Shorter Notices'; 'Notes,' and 'New Publications'; 'Twelfth Annual List of Published Papers' and index of volume 9.

THE July number (volume 4, number 3) of the *Transactions of the American Mathematical Society* contains: 'On the Point-Line as Element of Space: A Study of the Corresponding Bilinear Connex,' by E. Kasner; 'On the Formation of the Derivatives of the Lunar Coordinates with Respect to the Elements,' by E. W. Brown; 'On Reducible Groups,' by S. Epstein; 'Theory of Linear Associative Algebra,' by J. B. Shaw; 'Projective Coordinates,' by F. Morley; 'On an Extension of the 1894 Memoir of Stieltjes,' by E. B. Van Vleck; 'On the Variation of the Arbitrary and Given Constants in Dynamical Equations,' by E. W. Brown; 'The Primitive Groups of Class $2p$ which Contain a Substitution of Order p and degree $2p$,' by W. A. Manning; 'Complete Sets of Postulates for the Theory of Real Quantities,' by E. V. Huntington.

THE University of Chicago will begin the publication on January 1 of a journal of infectious diseases, edited by Professors Ludwig Hektoen and E. O. Jordan. It is said that the journal will be endowed with \$125,000 by Mr. and Mrs. Arnold F. McCormick.

SOCIETIES AND ACADEMIES.

THE UNIVERSITY OF CHICAGO MEDICAL CLUB.

THE University of Chicago Medical Club, organized October, 1901, began its second season with a special meeting on December 1, 1902, at which Professor G. N. Stewart, who has succeeded Professor Loeb in the chair of physiology at the university, presented an interesting paper on 'Problems and Methods of Modern Physiology.'

On January 19, 1903, the club held its first regular meeting for the season, electing as officers for the year, Lewellys F. Barker, president, and Frank R. Lillie, secretary.

Meetings of the club were held through the winter and spring, as usual, once a fortnight,